Midland College Syllabus
2022 - 2023
MATH 2420
Differential Equations
4 Semester Credit Hours
(4 Lecture/0 Lab)

Instructor Information:

Instructor: Click here to enter text.
Office: Click here to enter text.
Phone: Click here to enter text.
Email: Click here to enter text.
Office Hours: Click here to enter text.

Notice: Students MUST actively participate by completing an academic assignment required by the instructor by the official census date. Students who do not actively participate in an academically-related activity may be reported as never attended and dropped from the course.

Course Description:
This course is designed to produce student proficiency in first order equations, linear differential equations, differential operators, Laplace transforms, and the applications of differential equations. It also introduces power series methods, linear systems, and numerical methods. Prerequisite: A C or better in MATH 2414.

Text, References and Supplies:

- Boyce, DiPrima, and Meade. Elementary Differential Equations, 11th edition, Wiley
  - ISBN:9781119499688
- Use of MATLAB is required.
- Scientific Calculator

Student Learning Outcomes:

Upon successful completion of this course, students will:

1. Identify homogeneous equations, homogeneous equations with constant coefficients, and exact and linear differential equations.
2. Solve ordinary differential equations and systems of equations using:
   a) Direct integration
   b) Separation of variables
   c) Reduction of order
   d) Methods of undetermined coefficients and variation of parameters
   e) Series solutions
   f) Operator methods for finding particular solutions
   g) Laplace transform methods
3. Determine particular solutions to differential equations with given boundary conditions or initial conditions.

4. Analyze real-world problems in fields such as Biology, Chemistry, Economics, Engineering, and Physics, including problems related to population dynamics, mixtures, growth and decay, heating and cooling, electronic circuits, and Newtonian mechanics.

Student Contributions, Responsibilities and Class Policies:
Students will be expected to comply with the policies outlined in the Midland College Catalog. Instructor policies concerning attendance and academic behavior are consistent with the policies in the catalog. Regular attendance is required to do well in this class.
Students will be evaluated based on the results of assessments outlined in the syllabus and Instructor Handout.

Attendance Policy:
It is the responsibility of the students to know the policies and procedures associated with absences. These policies are set by instructors. Excused absences may include, but are not limited to, illness, severe weather, and death in the family. Instructors will determine whether or not an absence is excused. Please visit the Midland College Catalog

Your lecture instructor will inform you on the first day of class as to the tentative dates and content for each exam. Students are expected to complete each exam. Your instructor will inform you on the first day of class as to make-up procedures for missed exams and any exemption procedures if they apply (See Instructor Handout).

Withdrawal Policy:
Students who have enrolled in a Texas public institution of higher education as a first-time freshman in fall 2007 or later are permitted to drop no more than six courses during the entire undergraduate career. This limit includes all transfer work taken at a Texas institution of higher education and to second baccalaureate degrees. This statute was enacted by the State of Texas in spring 2007 (Texas Education Code 51.907). Any course that a student drops after Census Day is counted toward the six-course limit if "(1) the student was able to drop the course without receiving a grade or incurring an academic penalty; (2) the student's transcript indicates or will indicate that the student was enrolled in the course; and (3) the student is not dropping the course in order to withdraw from the institution." Please visit the Midland College Catalog

Scholastic Dishonesty:
Midland College does not tolerate scholastic dishonesty or academic misconduct in any form. Please read the Student Rights & Responsibilities section in the Midland College Catalog for more information.

Evaluation of Students:
Students will be evaluated based on grades which may include the following but are not limited to:

Assessments	Percentage of Grade	Grade Range
Exams	55-70%	90-100 A
Quizzes/Activities/MATLAB	10-20%	89-80 B
Final Exam	20-25%	79-70 C
		69-60 D
		59-0 F

Course Schedule:
This class meets for 4 contact hours per week. For a tentative schedule of the class meetings and material to be covered during those meetings, please refer to the schedule distributed to each student on the first class meeting (See Instructor Handout).

Course Outline:
Chapter 1: Introduction
- 1.1 Some Basic Mathematical Models; Direction Fields
- 1.2 Solutions of Some Differential Equations
- 1.3 Classification of Differential Equations

Chapter 2: First-Order Differential Equations
- 2.1 Linear Differential Equations; Method of Integrating Factors
- 2.2 Separable Differential Equations
- 2.3 Modeling with First-Order Differential Equations
- 2.4 Differences Between Linear and Nonlinear Differential Equations
- 2.5 Autonomous Differential Equations and Population Dynamics
- 2.6 Exact Differential Equations and Integrating Factors
- 2.7 Numerical Approximation: Euler's Method
- 2.8 The Existence and Uniqueness Theorem

Chapter 3: Second-Order Differential Equations
- 3.1 Homogeneous Differential Equations with Constant Coefficients
- 3.2 Solutions of Linear Homogeneous Equations; the Wronskian
- 3.3 Complex Roots of the Characteristic Equation
- 3.4 Repeated Roots; Reduction of Order
- 3.5 Nonhomogeneous Equations; Method of Undetermined Coefficients
- 3.6 Variation of Parameters
- 3.7 Mechanical and Electrical Vibrations
- 3.8 Forced Periodic Vibrations

Chapter 4: Higher-Order Linear Differential Equations
- 4.2 Homogeneous Differential Equations with Constant Coefficients

Chapter 5: Series Solutions of Second-Order Linear Equations
- 5.2 Series Solutions Near an Ordinary Point, Part I
- 5.4 Euler Equations; Regular Singular Points

Chapter 6: The Laplace Transform
6.1 Definition of the Laplace Transform
6.2 Solution of Initial Value Problems

Chapter 7: Systems of First-Order Linear Equations
7.1 Introduction

Non-Discrimination Statement
Midland College does not discriminate on the basis of race, color, national origin, sex, disability or age in its programs and activities. The following individual has been designated to handle inquiries regarding the non-discrimination policies:
Tana Baker
Title IX Coordinator/Compliance Officer
3600 N. Garfield, SSC 131
Midland, Texas 79705
(432) 685-4781
tbaker@midland.edu
For further information on notice of non-discrimination, visit the ED.gov Office of Civil Rights website, or call 1 (800) 421-3481.

Americans with Disabilities Act (ADA) Statement:
Midland College provides services for students with disabilities through Student Services. In order to receive accommodations, students must visit www.midland.edu/accommodation and complete the Application for Accommodation Services located under the Apply for Accommodations tab. Services or accommodations are not automatic, each student must apply and be approved to receive them. All documentation submitted will be reviewed and a "Notice of Accommodations" letter will be sent to instructors outlining any reasonable accommodations.

Continuity of Instruction Statement:
In the event that on campus activities are suspended due to extenuating circumstances, such as weather or quarantine, the instructor will continue instruction in a manner that best supports the course content and student engagement. In this event, your instructor will notify students of the change via Click here to enter text. At that time, they will provide details about how instruction and communication will continue, how academic integrity will be ensured, and what students may expect during the time that on campus activities are suspended. If a student becomes unable to continue class participation due to extenuating circumstances, (e.g., health and safety, loss of power, etc.) the student should contact their instructor and advisor for guidance. Resources are available to

students via the SOS program. Information can be found at https://www.midland.edu/services-resources/student-services/sos.php.

Grievances or complaints:
Concerns should be expressed as soon as possible to allow for early resolution. Midland College encourages students to discuss their concerns with their instructor first. If you feel uncomfortable discussing your situation with your instructor, students should discuss their concerns with the Chair of the appropriate department (Biology Chair – Mr. Tomas Hernandez (432-685-6751), Chemistry Chair – Mr. John Anderson (432-685-6737), Engineering and Physics Chair – Dr. Brian Flowers (432-685-4586), Geology Chair – Mr. Antony Giles (432-685-5580), Kinesiology Chair – Ms. Sheena Thompson (432-685-4579), Math Chair – Dr. Krista Cohlmia (432-685-4541) then the Dean of Math and Science – Dr. Miranda Poage (432-685-4561). If a resolution is still not possible, students may proceed with the formal complaint process.
http://catalog.midland.edu/content.php?catoid=14&navoid=2579#grievances-and-complaints.

Math & Science Division Information:
Division Office: AHSF 124 (432) 685-4561
Division E-Mail: mns@midland.edu

Department Chair: Dr. Krista Cohlmia (432) 685-4541
Dean: Dr. Miranda Poage
Secretary: Sarah Anderson
Clerk: Liliana Orcutt

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